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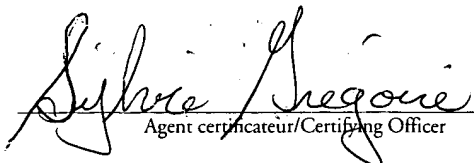
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Specification and Drawings, as originally filed, with Application for Patent Serial No:  
**CA 2452085**, on December 4, 2003, by **TM4 INC.**, assignee of Didier Perrin, for "Cooling  
Assembly for Electric Machine".

  
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**ABSTRACT OF THE DISCLOSURE**

A cooling assembly to be inserted in electric machines includes a generally cylindrical body to be inserted inside the internal stator of an electric machine. The body includes a top surface provided with angled holes forming V-shaped channels inside the body. Intersecting V-shaped channels are closed by plugs to thereby define a continuous cooling channel inside the body.

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**TITLE OF THE INVENTION**

Cooling assembly for electric machine

**FIELD OF THE INVENTION**

[0001] The present invention relates to electric machines. More specifically, the present invention is concerned with a cooling assembly to be mounted inside the stator of an electric machine.

**BACKGROUND OF THE INVENTION**

[0002] Electric machines are well known in the art. They usually have a fixed stator and a rotating rotor. Generally the stator is external and the rotor is rotatably mounted inside the stator, coaxial with it.

[0003] In some electric machines, the stator is internal and the cylindrical rotor is coaxially mounted outside the stator. These machines will be referred herein as internal stator electric machines.

[0004] Cooling internal stator machines is a challenge since one cannot rely on the air surrounding the stator as a cooling medium.

**OBJECTS OF THE INVENTION**

[0005] An object of the present invention is therefore to provide a cooling device for an electric machine.

[0006] Other objects, advantages and features of the present invention will become more apparent upon reading of the following non-

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restrictive description of preferred embodiments thereof, given by way of example only with reference to the accompanying drawings.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

**[0007]** In the appended drawings:

**[0008]** Figure 1 is a perspective view of an internal stator of an electric machine provided with a cooling device according to an embodiment of the present invention;

**[0009]** Figure 2 is a top plan view of the cooling device of Figure 1; and

**[0010]** Figure 3 is a sectional view taken along line 3-3 of Figure 2.

### **DETAILED DESCRIPTION**

**[0011]** In a nutshell, the present invention proposes to use a generally cylindrical body to be inserted inside the internal stator of an electric machine. The body includes a top surface provided with angled holes forming V-shaped channels inside the body. Intersecting V-shaped channels are closed by plugs to thereby define a continuous cooling channel inside the body.

**[0012]** Figure 1 of the appended drawings illustrates a cooling assembly 10 mounted inside an internal stator 12 of an electric machine (not shown). The cooling assembly includes a cylindrical body 14 having a generally circular cross-section and plugs 16 as will be described hereinbelow.

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**[0013]** As can be better seen from Figure 2, the body 14 includes an external surface 18, an internal surface 20 and a top surface 22. The internal surface is configured and sized to contact the internal surface of the stator 12.

**[0014]** Turning now to Figure 3 of the appended drawings, the top surface 22 of the body 14 includes holes 24 that are angled with respect to a longitudinal axis 26 of the body 14. The holes 24 are so spaced and angled so that their bottom end meet with an adjacent hole 24 before the body 14 is completely traversed. V-shaped channels are thus formed.

**[0015]** At the surface 22, adjacent V-shape channels are so positioned that their top portion meet with adjacent V-shaped channels.

**[0016]** A longitudinal hole 28 is made at the junction of each V-shaped channel with adjacent V-shaped channels. These holes 28 are so configured and sized as to receive a deformable plug 16 therein.

**[0017]** Deformable plugs are well known in the art and will not be described in detail herein. For example, the Betaplug<sup>TM</sup> manufactured by the Lee Company, Westbrook, CT, USA, has been found an adequate plug 16.

**[0018]** Once the plugs 16 are inserted in the holes 28, a cooling circuit is formed. This cooling circuit has an inlet 30 and an outlet 32. Of course, connectors (not shown) are mounted to the inlet 30 and outlet 32.

**[0019]** One skilled in the art will understand that the manufacture of the cooling assembly 10 is simple. The main steps are the formation of the body 14 having the required dimensions; the drilling of the angled holes 24 (by

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using a drill-press, for example); the drilling of the longitudinal holes 28 (by using a drill-press, for example); the insertion of the plugs 16 in the longitudinal holes 28; the insertion of the connectors to the inlet and outlet 30 and 32.

**[0020]** It is to be noted that the insertion of the plugs in the holes 28 may require the tapering of the holes 28. Of course, the instructions of the plug manufacturer should be followed.

**[0021]** It is to be noted that while the body of the cooling assembly is shown herein as having a circular cross-section, other tubular cross-sections could be used. For example, the body could have an hexagonal cross-section.

**[0022]** Although the present invention has been described hereinabove by way of preferred embodiments thereof, it can be modified, without departing from the spirit and nature of the subject invention as defined in the appended claims.

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**WHAT IS CLAIMED IS:**

1. A cooling device for an internal stator of an electric machine; said cooling device comprising a generally tubular body having an external surface configured and sized to be inserted inside the internal stator; said body including a top surface provided with at least two pair of holes defining V-shaped channels; intersections of said V-shaped channels being closed via plugs.

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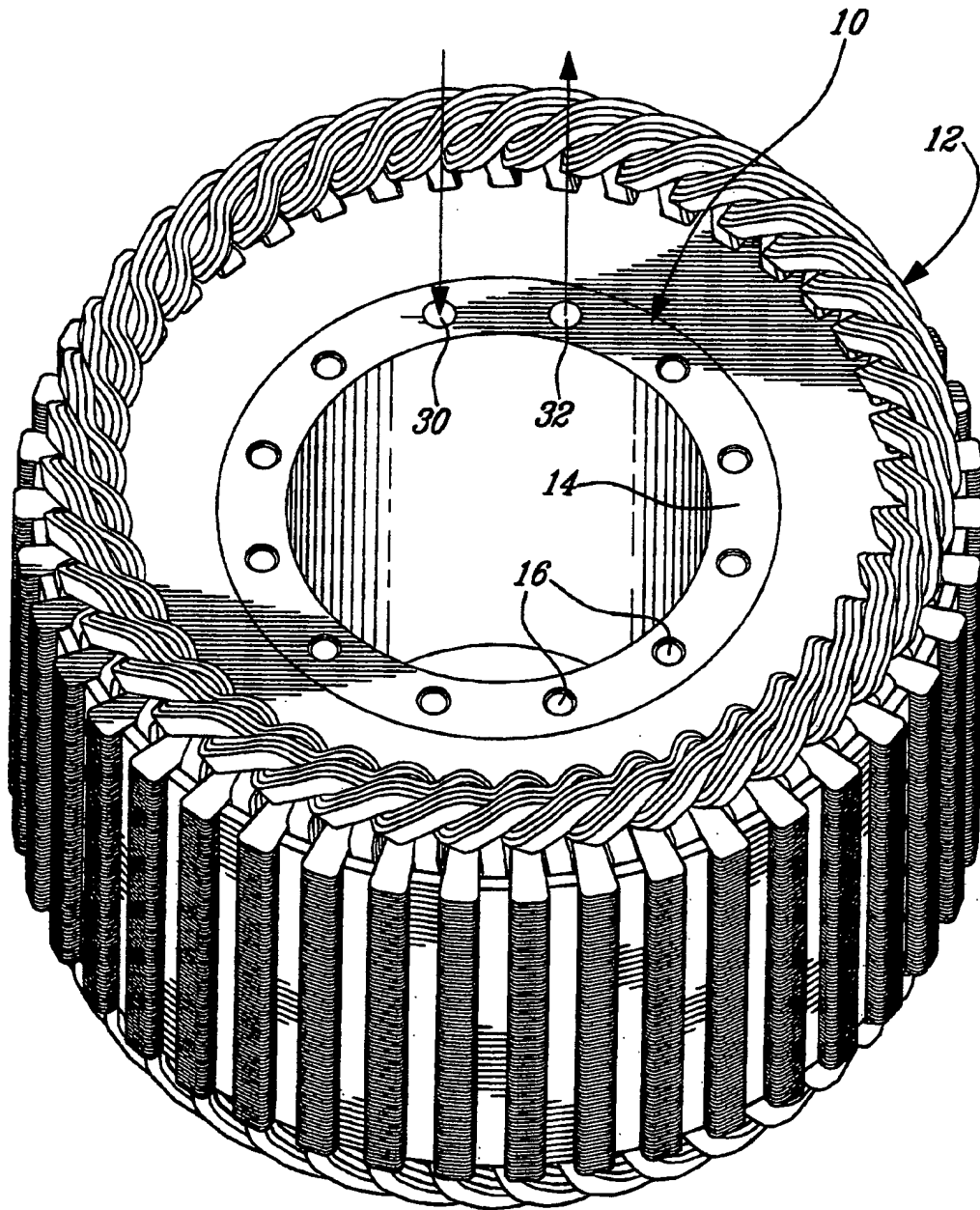
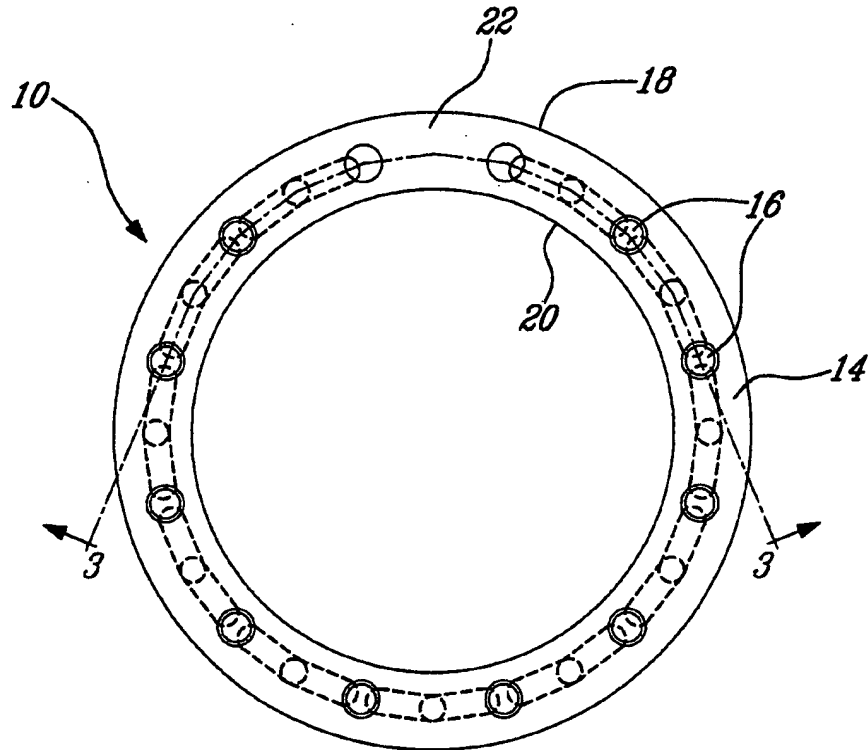
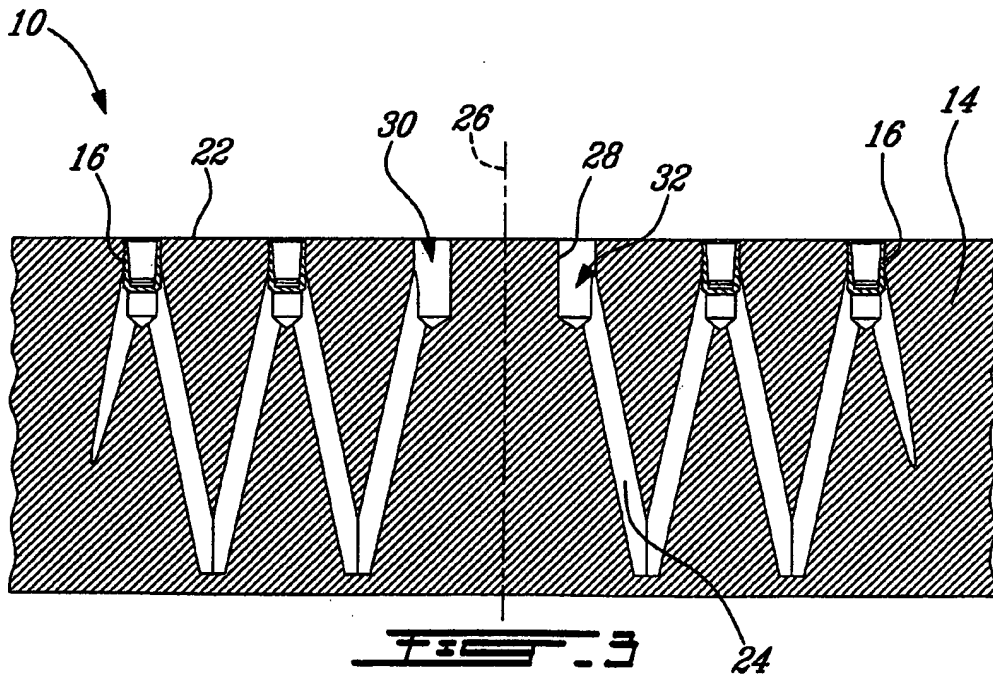


FIG. 1





**FIG. 2**



**FIG. 3**